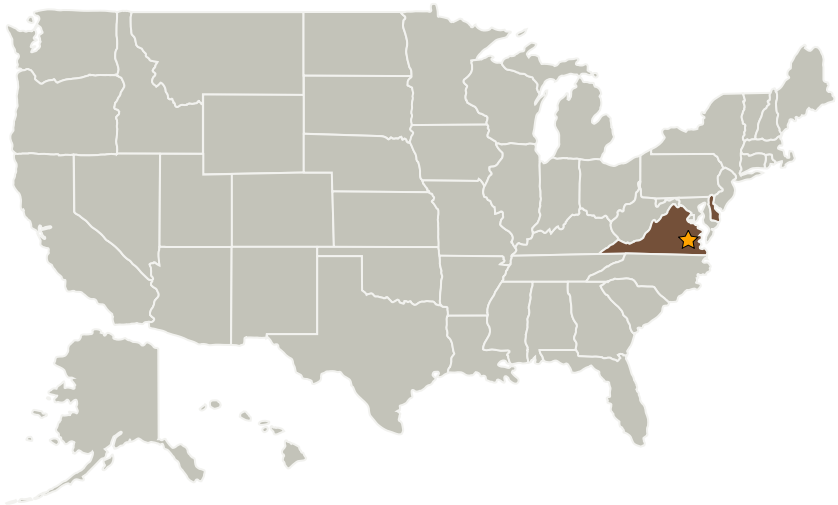
Generating Autoclave-Level Mechanical Properties with Out-of-Autoclave Thermoplastic Placement of Large Composite Aerospace Structures, Phase I

Completed Technology Project (2008 - 2009)

Project Introduction

Out-of-autoclave thermoplastic tape/tow placement (TP-ATP) is nearing commercialization but suffers a moderate gap in mechanical properties compared with laminates fabricated via thermoset autoclave processing. Out-of-autoclave thermoplastic processing significantly lowers composite aerospace part costs, but the property gap must be closed. This STTR program, endorsed herein by Boeing and Cytec Engineered Materials, will remedy the mechanical property shortfall and enable large composite aerospace structure important to NASA to be manufactured without an autoclave. Accudyne is teaming with University of Delaware -- Center for Composite Materials to apply their state-of-the-art TP-ATP process/property models to elucidate the physical mechanisms affecting microstructural quality that cause the property gap. Models will be applied to the NASA LaRC TP-ATP deposition head to optimize the head configuration and machine operating parameters, and the control systems for full mechanical properties. Laminates will be manufactured to demonstrate the property improvements. The process, head, and equipment changes will be upgraded on the NASA-LaRC thermoplastic tape head. In Phase 2, process/head modeling will be extended through laminate fabrication and testing, and a component of interest to NASA will be fabricated demonstrating the improved "autoclave level" mechanical performance.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Accudyne Systems, Inc.	Supporting Organization	Industry	Newark, Delaware

Primary U.S. Work Locations	
Delaware	Virginia

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Mark B Gruber

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.2 Computational Materials